



**FIGURE 3.1 Exposure Pathways Incorporated into the RESRAD-BUILD Code**

Eckerman and Ryman 1993). The dose is calculated for one receptor only. The receptor is at the center of the floor at a height of 1 m. The critical group receptor occupies a room with contaminated sources. For a site-specific analysis, the total number of sources, source types, source locations, room area, and room height should be site specific. Table 3.1 lists the key parameters used in the building occupancy and building renovation scenarios. Only those parameters that would be different are listed, the other parameters are site specific or are kept at RESRAD-BUILD defaults. It is assumed that for the building occupancy scenario, contamination is only on the surface, while for the renovation scenario, contamination is volumetric. Detailed descriptions of parameters and their distributions are given in Appendix J. The technical basis for calculating radiation doses for the building occupancy scenario and the related parameter distributions are provided in Biwer et al. (2002).

**TABLE 3.1 Key Parameters Used in the Building Occupancy and Building Renovation Scenarios**

Parameter	Unit	Parameter Values		Remarks
		Building Occupancy <sup>a</sup>	Building Renovation <sup>b</sup>	
Exposure duration	days (d)	365.25	179.00	To match the occupancy period of 365.25 days in NUREG/CR-5512 building occupancy scenario (Beyeler et al. 1999) and renovation period of 179 days in NUREG/CR-5512 building renovation scenario (Wernig et al. 1999).
Indoor fraction	— <sup>c</sup>	0.267	0.351	To match the 97.5 d/yr time in building in NUREG/CR-5512 building occupancy scenario (Beyeler et al. 1999) and 62.83 days spent in the building during renovation period in NUREG/CR-5512 building renovation scenario (Wernig et al. 1999).
Receptor location	m	0, 0, 1	0, 0, 1	At 1-m from the center of the source.
Receptor inhalation rate	m <sup>3</sup> /d	33.6	38.4	For building occupancy scenario it matches with 1.4 m <sup>3</sup> /h breathing rates in NUREG/CR-5512 (Beyeler et al. 1999) and for building renovation scenario it matches with 1.6 m <sup>3</sup> /h breathing rate of moderate activity given in the EPA Exposure Factor Handbook (EPA 1997).
Receptor indirect ingestion rate	m <sup>2</sup> /h	1.12 × 10 <sup>-4</sup>	0	Value for the building occupancy scenario is the mean value from the distribution and for the building renovation scenario it is assumed the ingestion is only from the direct contact with the source.
Source type	—	Area	Volume	For building occupancy scenario it is assumed that contamination is only on the surfaces, whereas for the building renovation scenario contamination is volumetric.

3-4

**TABLE 3.1 (Cont.)**

Parameter	Unit	Parameter Values		Remarks
		Building Occupancy <sup>a</sup>	Building Renovation <sup>b</sup>	
Direct ingestion rate	l/h (area)g/h (volume)	$3.06 \times 10^{-6}$	0.052	Calculated from the default ingestion rate of $1.1 \times 10^{-4}$ m <sup>2</sup> /h in NUREG/CR-5512 building occupancy scenario (Beyeler et al. 1999). The effective transfer rate from NUREG/CR-5512 building renovation scenario for ingestion of loose dust to the hands and mouth during building renovation (Wernig et al. 1999).
Air release fraction	–	0.357	0.1	For the building occupancy scenario, it is the mean value from the parameter distribution (Appendix J). For the building renovation scenario, a smaller fraction is respirable.
Removable fraction	–	0.1	NR <sup>d</sup>	10% of the contamination is removable (NUREG/CR-5512 building occupancy scenario default). The parameter is not required for the volume source.
Time for source removal or source lifetime	d	10,000	NR	Value for the building occupancy scenario is the most likely value from the parameter distribution (Appendix J). The parameter is not required for the volume source.
Source erosion rate	cm/d	NR	$4.1 \times 10^{-4}$	For the building renovation scenario, it is assumed that the total source thickness of 15 cm can be removed in 100 years of building life.

<sup>a</sup> Parameter values used in the building occupancy scenario.

<sup>b</sup> Parameter values used in the building renovation scenario.

<sup>c</sup> A dash indicates that the parameter is dimensionless.

<sup>d</sup> NR = parameter not required for the analysis.